

## **Non-CO<sub>2</sub> Greenhouse Gases: High-GWP Gases**

**Source/Sectors:** Substitution of ODS/End-uses of MDIs

**Technology:** Dry powder inhalers (C.1.2.1)

### **Description of the Technology:**

Dry Powder Inhaler (DPIs) consists of micro dry powders that can replace metered dose inhalers (MDIs) to treat asthma and chronic obstructive pulmonary disease (USEPA, 2001). There are also newly developed medications that would be swallowed, rather than inhaled, which may be introduced over the next 10 to 20 years (USEPA, 2006b).

**Effectiveness:** It has proven to be very successful where it is applicable (USEPA, 2001).

**Implementability:** Due to stringent performance and toxicology specifications, the applicability of this alternative is limited to patients who are able to inhale robustly enough to transport the powder to the lungs (USEPA, 2001).

**Reliability:** Successful but limited usage

**Maturity:** It has been successfully used with most anti-asthma drugs; it account for 85% of inhaled medication. These options are especially wide-adopted in Europe (USEPA 2001). For example, it accounts for more than 65% of inhaled medication in Holland (UNEP, 2002).

**Environmental Benefits:** HFCs emission reduction

### **Cost Effectiveness:**

<b>Technology</b>	<b>Lifetime (yrs)</b>	<b>MP (%)</b>	<b>RE (%)</b>	<b>TA (%)</b>	<b>Capital cost</b>	<b>Annual cost</b>	<b>Benefits</b>
Dry powder inhalers <sup>1</sup>	15	5	100	50	\$294.21	\$0.00	0.00

Note: MP: market penetration; RE: reduction efficiency; TA: technical applicability; costs are in year 2000 US\$/MT<sub>CO<sub>2</sub>-Eq.</sub>

1: USEPA (2001), IEA (2003), & USEPA (2004)

**Industry Acceptance Level:** In the US, DPIs usage is on the rise in the United States; it made up 14% of the total US market share as of mid-2002 (UNEP, 2002). In Europe, it is widely adopted. The use of DPIs is estimated to expand more in the future (IEA, 2003).

**Limitations:** They may not be applicable to all patients or all drugs; they are not suitable for young children, the elderly, and persons with severe asthma (IEA, 2003; USEPA, 2001). Another concern is that the powder may aggregate under hot and humid climates (USEPA, 2006b).

### **Sources of Information:**

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